

What is claimed is

1. A method for inducing differentiation of mammalian embryonic stem cells into functioning cells, which comprises the steps of;

5           1) culturing the mammalian embryonic stem cells together with feeder cells with a medium comprising leukemia inhibitor factor;

          2) culturing the obtained cells in absence of feeder cells with a medium comprising leukemia Inhibitor factor and basic FGF in a suspension culture condition to give embryonic bodies;

          3) culturing the obtained embryonic bodies with a selection-expanding medium; and

          4) culturing the obtained cell clusters with a differentiation medium to give functioning cells.

2. The method of claim 1, wherein the medium used in step 2) comprises about 100-10000 U/ml of leukemia inhibitor factor.

3. The method of claim 1, wherein the medium used in step 2) comprises about 2-100 ng/ml of bFGF.

4. The method of claim 1, wherein the medium used in step 3) comprises nicotinamide, insulin and fibronectine in an serum-free cell culture medium.

5. The method of claim 1, wherein the functioning cells are insulin producing pancreatic islet like cell clusters.

10054789-012502

6. The method of claim 5 wherein the medium used in step 4) comprises nicotinamide, insulin and laminine in a serum-free cell culture medium.

5 7. The method of claim 1, wherein the functioning cells are nerve like cells.

8. The method of claim 7 wherein the medium used in step 4) comprises L-lysine, insulin and laminine in a serum-free cell culture medium.

10 9. Functioning cells induced from mammalian ES cells by the method of claim 1.

10. Insulin secreting cell clusters induced from mammalian ES cells by the method of claim 5.

11. Nerve like cells induced from mammalian ES cells by the method of claim 7.

15 12. A method for treating a mammalian patient having disorders in pancreatic islet function, which comprises implanting pancreatic islet-like cell clusters induced from allogenic ES cells by the method of claim 5 to the patient.

20 13. The method of claim 12, wherein the patient is type I diabetic patient.

14. A method for treating a mammalian patient having disorders in nerve function, which comprises implanting nerve like cells induced from allogenic ES cells by the method of claim 7 to the patient.

10054789-012502